EXHIBIT 5

GD549 S38 80 Ø025

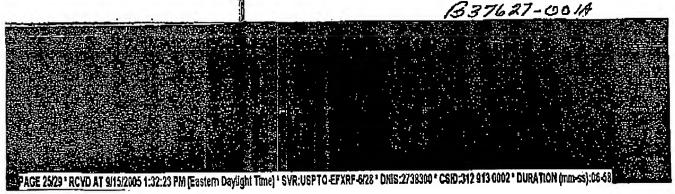
Introduction to Colloid and Surface Chemistry

Third Edition

DUNCAN 1. SHAW, BSc, PaD
Principal Lecturer in Physical Chemistry,
Department of Chemistry and Biochemistry,
Liverpool Polytechnic

SANDIA LABORATURIES P.O. SOX SOO ALBUQUESQUE, NEW MEXICO 65888

BUTTERWORTHS Lendon -- Boston Sydney -- Willington -- Durban -- Tenento



ج.

BEST AVAILABLE COPY

CHANGED INTERFACES

S

egnanowe not

kinds of counterious are present, and can be represented by the equation In exchange involves an electric double layer situation in which two

RA + 11 = RU + A

consentration and charge number are of printry importance. R may as -NHJ). A tenge of highly porous synthetic cation and anion exchange be a cation exchanger (lived negatively charged groups, such as -80% of pustion in the alexile double layer around R, and, in this respect, resing the available commercially. The potestly of the resin facilitates —COO") or as onion exchanger (liked positively charged groups, such where R is a charged perous solld. Counter-ions A and B coropete for filify rapid ion exchange. EN SERVICION DE LA COMPANSION DE LA COMP

of water and the 'delonisation' of vister. The most important applications of ion exchange are the softening

passing a strong-solution of redium chlorids through the column. tons in the water exchange with the singly charged soddin lious in the of a cutton exchange roun bundly saturated with notion countertons. resin, thus sociening the water. Regeneration of the resin is effected by The doubly charged (and, therefore, more strongly advoided) calclust In the first of these processes, hard water is passed through a column The 'defonisation' of water involves both action and callon exchange

exchange with the cotions and anions in the weler sumple and combine of a mixed ion exchange resin. These hydrogen and hydroxyl ions A collem exchange ustn saturated with hydrogen long and on order exchange resin saturated with hydroxyd lons are used, often in the form

the separation of the was earths is usually echieved by cation exchange followed by elution of their complexes with eithic add. Jon exchange has many preparative and assiyuted uses; for example

ELECTROKINETIC PHENOMENA 107

which order when attempts are made to shear off the mobile part of the electric donble Layor from a charged surface. Electrokinetic is the general description applied to four phenomena

relative to each other. parfoce and the diffuse part of the double layer on much to now

The four electrokinetic phenomena are as follows:

Biegropherests — the movement of a charged surface pitra elleched liquid by an applied electric field. material (i.e., dissolved or suspended material) relative to stationary

 $\boldsymbol{\epsilon}$

B

- Alexanogenous the movement of lightly relative to a stationary paceasary to counterbolance electro-estable flow is terraid charged suches (e.g. a capillary or purous ging) by an applied electro-campile pressure. electric field (i.e. the complement of electrophoses). The preside 댦
- (3). Streaming potential—the electric field which is created when \mathfrak{S} Sedimonation potential — the electric field which is cereted when liquid is made to flow along a stationary charged surface (i.e. the charged partiales more arietive to stationary liquid (i.e. the opposite opposite of elegino-osmosse)

owing to experimental difficulties. various forms, whereas electro-osmocis and streeming potential have obestrokingele phenomena and has been studied extensively in been studied to a moderate extent and sedimentation potential intely Electrophoresis has the greatest purclical applicability of . Heze F

of alectrophocasis).

Electrophoresis (18)

tion of colioidal susterial in an elacido field. A number of includences bare been developed for skulying the inter-

Particle (plantappe) electrophorasts

suspension or emulsion containing mismesopically tethie poeticles or If the material under investigation is in the form of a materially stable

CHARGED INTERFACES 蔻

surface (plus attended material) tends to move in the appropriate discomigration in the opposite direction, carrying salvent along with them, Uca, while the tota in the mobile part of the double leyerations a not force is exerted on both parts of the electric double legar. The charged thus causing its flow. Conversely, an electric field is coasted if the charged If an electric field is applied langentially along a charged surface, a

PAGE 26/29 * RCVD AT 9/15/2005 1:32:23 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-6/28 * DNIS:2738300 * CS(D:312 913 0002 * DURATION (mm-ss):05-58